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(54) **THERMOPLASTIC RESIN COMPOSITION FOR CLEANING MOLDING MACHINE**

(57) To provide a thermoplastic resin composition for cleaning a molding processing machine, which has good cleaning performance and workability in cleaning an inner side of a molding processing machine of thermoplastic resin composition, such as an extruder and an injection molding machine. A thermoplastic resin composition for cleaning a molding processing machine, which includes (A) an olefin-based resin, (B) a thermoplastic resin which

is not compatible with the olefin-based resin of the component (A), (C) a thermoplastic resin for making the olefin-based resin of the component (A) and the thermoplastic resin of the component (B) compatible with each other, (D) an alkaline metal salt of a fatty acid, (E) a nonionic surfactant, and (F) a metal salt of an acidic phosphoric ester.

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Description

Technical Field

5 **[0001]** The present invention relates to a thermoplastic resin composition for cleaning a molding processing machine, which cleans a molding processing machine such as an extruder or an injection molding machine.

Background Art

10 **[0002]** As a cleaning agent for cleaning a molding processing machine of a thermoplastic resin composition, there is known one obtained by combining a base resin and other components.

[0003] In JP-A 2010-95624, JP-A 2010-95625, JP-A 2011-46808, JP-A 10-279816, and JP-A 2007-21765, there are disclosed cleaning compositions in which a base resin and an anionic surfactant are combined.

15 Summary of the Invention

[0004] The problem to be solved by the present invention is to provide a thermoplastic resin composition for cleaning a molding processing machine, in which cleaning performance is further enhanced by combining a base resin and a surfactant.

20 **[0005]** The present invention has been completed by finding that cleaning performance is further enhanced and that workability is also enhanced by, when combining a base resin and a surfactant, combining a nonionic surfactant and further combining a metal salt of an acidic phosphoric ester.

[0006] According to the present invention, there is provided a thermoplastic resin composition for cleaning a molding processing machine, which contains:

- 25 (A) an olefin-based resin,
 (B) a thermoplastic resin which is not compatible with the olefin-based resin of the component (A),
 (C) a thermoplastic resin for making the olefin-based resin of the component (A) and the thermoplastic resin of the component (B) compatible with each other,
 30 (D) an alkaline metal salt of a fatty acid,
 (E) a nonionic surfactant, and
 (F) a metal salt of an acidic phosphoric ester.

35 **[0007]** The present invention can provide an application in which the aforementioned thermoplastic resin composition is used for cleaning a molding processing machine.

Detailed Description of the Invention

40 **[0008]** According to the thermoplastic resin composition for the cleaning of the present invention, there are obtained good cleaning performance and workability in cleaning an inner side of a molding processing machine of thermoplastic resin composition, such as an extruder or an injection molding machine.

<Component (A)>

45 **[0009]** The component (A) is an olefin-based resin.

[0010] Preferable olefin-based resin of the component (A) is one or more kinds selected from HDPE, LDPE, LLDPE and a polypropylene homopolymer, a copolymer of ethylene and propylene, a copolymer of ethylene and/or propylene and a copolymerizable monomer thereof, and the like.

50 <Component (B)>

[0011] The component (B) is a thermoplastic resin which is not compatible with the olefin-based resin of the component (A).

55 **[0012]** Preferable thermoplastic resin of the component (B) is one or more kinds selected from AS resin, MS resin, a copolymer of methyl methacrylate-maleic anhydride-styrene, and PMMA resin.

<Component (C)>

[0013] The component (C) is a thermoplastic resin for making the olefin-based resin of the component (A) and the thermoplastic resin of the component (B) compatible with each other.

[0014] Preferable thermoplastic resin of the component (C) is one or more kinds selected from EEA, EMA, EMMA, and EBA.

[0015] With respect to content ratios of the components (A) to (C) in the composition;
a content ratio of the component (A) is preferably 30 to 90% by mass, more preferably 40 to 80% by mass,
a content ratio of the component (B) is preferably 8 to 60% by mass, more preferably 15 to 50% by mass,
a content ratio of the component (C) is 2 to 20% by mass, more preferably 5 to 15% by mass.

<Component (D)>

[0016] The alkaline metal salt of a fatty acid (D) is preferably a Na, K, Li, Cs salt of a saturated or unsaturated fatty acid having 10 to 22 carbon atoms. The fatty acid may have a straight chain or a branched chain.

[0017] Among them, more preferable is a Na salt of a fatty acid having 12 to 18 carbon atoms (lauric acid, myristic acid, palmitic acid, stearic acid, oleic acid).

[0018] A content ratio of the alkaline metal salt of a fatty acid of the component (D) in the composition is 0.5 to 10 parts by mass relative to 100 parts by mass of the total amount of the components (A) to (C), preferably 1 to 10 parts by mass, and more preferably 1 to 6 parts by mass.

<Component (E)>

[0019] Examples of the nonionic surfactant of the component (E) include one selected from an oxyethylene chain-type surfactant, a sorbitan ester-type surfactant, a glyceride-based (glycerine (mono, di) fatty acid esters) surfactant, a 12-hydroxystearic acid ester, a propylene glycol fatty acid ester, a sucrose fatty acid ester, an alkyl glyceryl ether, an alkyl glucoside, and the like.

[0020] Among them, preferable are one or more kinds selected from a sorbitan ester-type surfactant, a glyceride-based surfactant, a 12-hydroxystearic acid ester.

[0021] A content ratio of the nonionic surfactant of the component (E) in the composition is 0.5 to 10 parts by mass relative to 100 parts by mass of the total amount of the components (A) to (C), preferably 1 to 10 parts by mass, and more preferably 1 to 6 parts by mass.

[0022] A content ratio of the component (D) in the total mass of the components (D) and the component (E) is preferably 30 to 70% by mass, more preferably 40 to 60% by mass, and a content ratio of the component (E) corresponds to a residual proportion.

<Component (F)>

[0023] The component (F) is a metal salt of an acidic phosphoric ester. The component (F) is a component which acts, when using the component (D) and the component (E) together, so as to prevent generation of a gas (gas that contains a fatty acid and the like) produced by decomposing the component (E) due to the action of the alkaline metal contained in the component (F).

[0024] As the component (F), there can be used, for example, a salt of an acidic phosphoric ester represented by the general formula (I) or (II) described from the paragraph 0021 to the paragraph 0032 of JP 2010-189515 A.

[0025] The preferable component (F) is magnesium stearyl acid phosphate, calcium stearyl acid phosphate, zinc stearyl acid phosphate, aluminum stearyl acid phosphate, and the like.

[0026] As the component (F), there can be used commercially available products, and there can be used, for example, zinc stearyl acid phosphate (LBT1830 manufactured by SAKAI Chemical Industry Co., Ltd.), aluminum stearyl acid phosphate (LBT1813 manufactured by SAKAI Chemical Industry Co., Ltd.), calcium stearyl acid phosphate (LBT1820 manufactured by SAKAI Chemical Industry Co., Ltd.), magnesium stearyl acid phosphate (LBT-1812), and the like.

[0027] A content ratio of the component (F) in the composition is preferably 10 to 100 parts by mass relative to 100 parts by mass of the total amount of the component (D) and the component (E), more preferably 10 to 80 parts by mass.

<Other components>

[0028] The composition of the present invention can further contain an inorganic filler. The examples of the inorganic filler other than a well-known glass fiber and a metal fiber can include one selected from molten slag, steel slag or crushed materials thereof, artificial mineral fibers which are described in JP 2006-257297 A, and can be used in a fibrous

or non-fibrous form (powder, granules, crushed materials, and the like).

[0029] The composition of the present invention can further include an alkylene glycol fatty acid ester, an organic phosphorous compound, a polyalcohol, a metal soap described in JP 2006-257297 A.

[0030] The composition of the present invention is manufactured by, after pre-mixing the aforementioned components with a mixer such as Henschel mixer, a tumbler blender or a kneader, kneading the resultant components with an extruder, or melt-kneading the components with heated rolls, and Banbury mixer.

Examples

Examples and Comparative Examples

[0031] The respective components having the compositions shown in Table 1 were mixed with a tumbler blender, and then melt-kneading with an extruder gives pelletized resin compositions. By using these compositions, the cleaning test was conducted according to the following method. The results are shown in Table 1.

[0032] As a precedent resin to be used, 1 kg of a red colored product of HDPE (concentration of red color 0.5 %) was injection-molded with an injection molding machine ("SH100" manufactured by Sumitomo Heavy Industries, Ltd.; Cylinder temperature 230 °C).

[0033] After that, by using the composition of Table 1, procedures of weighting and injection were repeated, cleaning was terminated at the moment when the red color disappeared, and a cleaning ability was evaluated by the amount used (kg) of the component until then.

[0034] Furthermore, after the termination of cleaning, a cleaning ability (the presence or absence of the preceding material) was evaluated from the viewpoint of whether or not red color of the precedent resin (preceding material HDPE) can be observed when flowing an AS resin (Cevian N 050SF manufactured by Daicel Polymer LTD.).

[Table 1]

	Examples				Comparative Examples					
	1	2	3		1	2	3	4	5	6
(A)	LLDPE	55	60		100		55	55	55	60
	HDPE			70		100				30
(B)	PMMA		30							
	MS	40		20			40	40	40	
(C)	EMA	5	10				5	5	5	
	EBA			10						10
(D)	Stearic acid Na	3	3	3	3	3	3		3	
	Nonionic surfactant 1	3		2	3	3		3	3	
(E)	Nonionic surfactant 2		2							
	Salt of acidic phosphoric ester	1	3	2	1	2	1	1		2
Amount used (kg) of component	0.5	1.0	1.0	1.0	2	2	2	2	1	1.5
Presence or absence of preceding material remaining	Not observed	Not observed	Not observed	Not observed	Observed	Observed	Observed	Observed	Not observed	Observed
Generation of gas	Not observed	Not observed	Not observed	Not observed	Not observed	Not observed	Not observed	Not observed	Observed	Not observed

Component (A)

[0035]

5 LLDPE: Nipolon-L T240F of Tosoh Corporation
HDPE: Hipolon Hard 6000 of Tosoh Corporation

Component (B)

10 **[0036]**

PMMA: ACRYPET MF of Mitsubishi Rayon Co., Ltd.
MS: Cevian MAS30 of Daicel Polymer LTD.

15 Component (C)

[0037]

20 EMA: Elvaloy AC 1820 of Du Pont Mitsui Polychemicals Co. , Ltd.
EBA: LOTRYL 30BA02 of Arkema K.K.

Component (D)

25 **[0038]**

Na stearate

Component (E)

30 **[0039]**

Nonionic surfactant 1: Diglycerin stearate
Nonionic surfactant 2: Sorbitan stearate

35 Component (F)

[0040] Salt of acidic phosphoric ester: Zinc stearyl acid phosphate (LBT-1830 manufactured by SAKAI Chemical Industry Co. , Ltd.)

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Claims

1. A thermoplastic resin composition for cleaning a molding processing machine, comprising:

45 (A) an olefin-based resin,
(B) a thermoplastic resin which is not compatible with the olefin-based resin of the component (A),
(C) a thermoplastic resin for making the olefin-based resin of the component (A) and the thermoplastic resin of
the component (B) compatible with each other,
(D) an alkaline metal salt of a fatty acid,
50 (E) a nonionic surfactant, and
(F) a metal salt of an acidic phosphoric ester.

2. The thermoplastic resin composition for cleaning a molding processing machine according to claim 1,
wherein, in the total mass of the components (D) and the component (E), a content ratio of the component (D) is
30 to 70% by mass, and a content ratio of the component (E) is 70 to 30% by mass, and
55 wherein a content ratio of the component (F) is 10 to 100 parts by mass relative to 100 parts by mass of the total
amount of the component (D) and the component (E).

3. The thermoplastic resin composition for cleaning a molding processing machine according to claim 1 or 2, wherein the salt of an acidic phosphoric ester of the component (F) is one selected from magnesium stearyl acid phosphate, calcium stearyl acid phosphate, zinc stearyl acid phosphate, and aluminum stearyl acid phosphate.
- 5 4. The thermoplastic resin composition for cleaning a molding processing machine according to any one of claims 1 to 3, wherein the nonionic surfactant of the component (E) is one or more kinds selected from a sorbitan ester-type surfactant and a glyceride-based surfactant.
- 10 5. The thermoplastic resin composition for cleaning a molding processing machine according to any one of claims 1 to 4, wherein the thermoplastic resin of the component (B) is one or more kinds selected from AS resin, MS resin, a copolymer of methyl methacrylate-maleic anhydride-styrene and PMMA resin.
- 15 6. The thermoplastic resin composition for cleaning a molding processing machine according to any one of claims 1 to 5, wherein the thermoplastic resin of the component (C) is one or more kinds selected from EEA, EMA, EMMA, and EBA.
7. The thermoplastic resin composition for cleaning a molding processing machine according to any one of claims 1 to 6, wherein the olefin-based resin of the component (A) is one or more kinds selected from HDPE, LDPE, LLDPE and a polypropylene homopolymer.
- 20 8. Use of the thermoplastic resin composition according to any one of claims 1 to 6 for cleaning a molding processing machine.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2013/050510

A. CLASSIFICATION OF SUBJECT MATTER

B29C33/72(2006.01)i, C08K5/098(2006.01)i, C08K5/103(2006.01)i, C08K5/521(2006.01)i, C08L23/00(2006.01)i, C11D1/04(2006.01)i, C11D1/34(2006.01)i, C11D1/68(2006.01)i, C11D3/37(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B29C33/00-33/76, C08K3/00-13/08, C08L1/00-101/14, C11D1/00-19/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2013

Kokai Jitsuyo Shinan Koho 1971-2013 Toroku Jitsuyo Shinan Koho 1994-2013

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, A	WO 2012/090620 A1 (Daicel Polymer Ltd.), 05 July 2012 (05.07.2012), claims; paragraph [0027] & JP 2012-140481 A & TW 201235397 A	1-8
A	JP 2009-249559 A (Kabushiki Kaisha Techno Plus), 29 October 2009 (29.10.2009), claims; paragraphs [0010], [0011] (Family: none)	1-8
A	JP 8-27335 A (Idemitsu Petrochemical Co., Ltd.), 30 January 1996 (30.01.1996), claims; paragraphs [0008] to [0025], [0031] to [0039] (Family: none)	1-8

☒ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search
10 April, 2013 (10.04.13)

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Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2013/050510

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2002-1734 A (Daicel Chemical Industries, Ltd.), 08 January 2002 (08.01.2002), claims; paragraphs [0010] to [0014], [0026] (Family: none)	1-8

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2010095624 A [0003]
- JP 2010095625 A [0003]
- JP 2011046808 A [0003]
- JP 10279816 A [0003]
- JP 2007021765 A [0003]
- JP 2010189515 A [0024]
- JP 2006257297 A [0028] [0029]